AIR QUALITY AND SMOKE MANAGEMENT

Introduction

This section of the FEIS discusses the current condition and proposed project's effects on air quality. Air quality is affected by smoke, dust, industrial sources, and motor vehicle exhaust. Forest Service activities generate smoke from occasional wildland fires and prescribed burning.

Differences Between the DEIS and FEIS

This Air Quality and Smoke Management section of the FEIS differs from the same section in the DEIS in that analysis for the new Alternative F was included. A paragraph was added to the sub-section about Montana Airsheds to better explain the Class 1 vs. Class 2 designation.

Information Sources

This analysis area coincides with that used for the Logan Creek Ecosystem Analysis at the Watershed Scale (Logan Creek EAWS) completed in 2001 (Exhibit A-1). Information collected for the EAWS as well as existing Forest Service databases, provided the information used to characterize the vegetation and forest fuel attributes within the project boundaries. Summaries of forest fuel model characteristics for all stands within the project area and fuel inventories are located in the project file (Exhibits O-15, and O-8, respectively).

The Forest Service Natural Resource Information System (NRIS) database was the primary source of data used to describe existing vegetation conditions. This database is used as a reference tool by agency employees, our partners, and the public. It provides consistent baseline data and standards from which to assess field related conditions and to base natural resource decisions. Summaries of vegetation and forest fuel characteristics for stands proposed for treatment are located in the project file (Exhibits P-4, O-8, and O-15). Aerial photos take in 1997 were interpreted and used to classify vegetation and geomorphological characteristics in the analysis area. These data are stored in the Flathead National Forest computer system and accessible with Geographic Information System (GIS) software.

These datasets are used as baseline inputs for comparative modeling to estimate the production of smoke emissions.

Analysis Area

Montana Airsheds

Montana is divided into 10 airsheds monitored by the Idaho/Montana Airshed Group. This group is tasked with minimizing or preventing smoke impacts while using fire to accomplish land management objectives The Flathead National Forest lies primarily within Airshed #2, which includes the majority of Flathead and Lake Counties, most of Sanders County, the northern portions of Missoula and Powell counties including the Swan River, the South Fork of the Flathead River drainages, and the northern half of Mineral County. The Kootenai National Forest, which is entirely in Airshed #1, lies immediately to the west and north of the Logan Creek drainage. Airsheds are managed by Airshed Groups composed of government agencies, timber companies that routinely perform prescribed burns, and with the assistance of meteorologists specifically assigned to the Airshed Group.

Each airshed in northwest Montana is designated as either Class 1 or Class 2 depending on how stringent the air quality standards are for that airshed. Glacier National Park and the Bob Marshall Wilderness Complex are within the Class 1 airshed designation, which has stricter visibility standards than the Class 2 airsheds of the Flathead National Forest and adjacent Kootenai National Forest (See Figure 3-6).

Air Quality Impact Zones / Nonattainment Areas

The Airshed Group has also established Air Quality Impact Zones. These zones consist of the local airsheds surrounding cities where emissions from prescribed burning could have adverse effects on air quality. The Flathead Valley is Impact Zone K and Libby is in Impact Zone L, which includes nonattainment areas. Areas within the State that have previously exceeded the national ambient air quality standards are classified as nonattainment.

Special air dispersion conditions and other factors are closely monitored and considered for each scheduled emission event in the impact zone. The intent is to continue to permit emissions from needed treatments under the acceptable ventilation conditions.

Sensitive Areas

Impacts from any burning within the decision area usually occur downwind in an easterly-northeasterly direction, as prevailing winds are from the west to southwest. Sensitive areas potentially affected include the wildland urban interface intermix community type within and adjacent to the analysis area, Tally Lake campground within the analysis area, Olney six miles to the northeast, and downwind nonattainment areas within 50 miles. These nonattainment areas are Whitefish (approximately 9 miles east of the analysis area), Columbia Falls (approximately 16 miles east), Kalispell (approximately 16 miles southeast), and the Class I Airsheds of Glacier National Park (21 miles to the east) and the Bob Marshall Wilderness Complex (approximately 30 miles to the east). The remainder of the Flathead National Forest and adjacent Kootenai National Forest lands are included in Class II Airsheds, where visibility standards are less strict.

Affected Environment

Historical Conditions

Burn mosaics indicate wildland fire played a major role in forming the vegetative patterns and the natural ecosystems in the northern Rocky Mountains. It is estimated that 1500 to 2000 fires burned annually in this area. These fires would have generated smoke for as short a time as a few hours to as long as 120 days. From the Logan Creek Fire History Study (Exhibit O-4) it is estimated that the theoretical arithmetic average of historical wildland fire acres burned annually is 410 for the approximate 61,000 acres analyzed. Fire size was highly variable, ranging from less than an acre to greater than 30,000 acres with larger fires prevalent on the landscape. The effect of settlement and subsequent fire protection was to reduce the total burned area and a reduction in the duration of smoke emissions.

There are no known data indicating Montana's historic air quality. The success of fire suppression may have resulted in a decrease in the annual amount of smoke generated by wildland fires since the early 1900s.

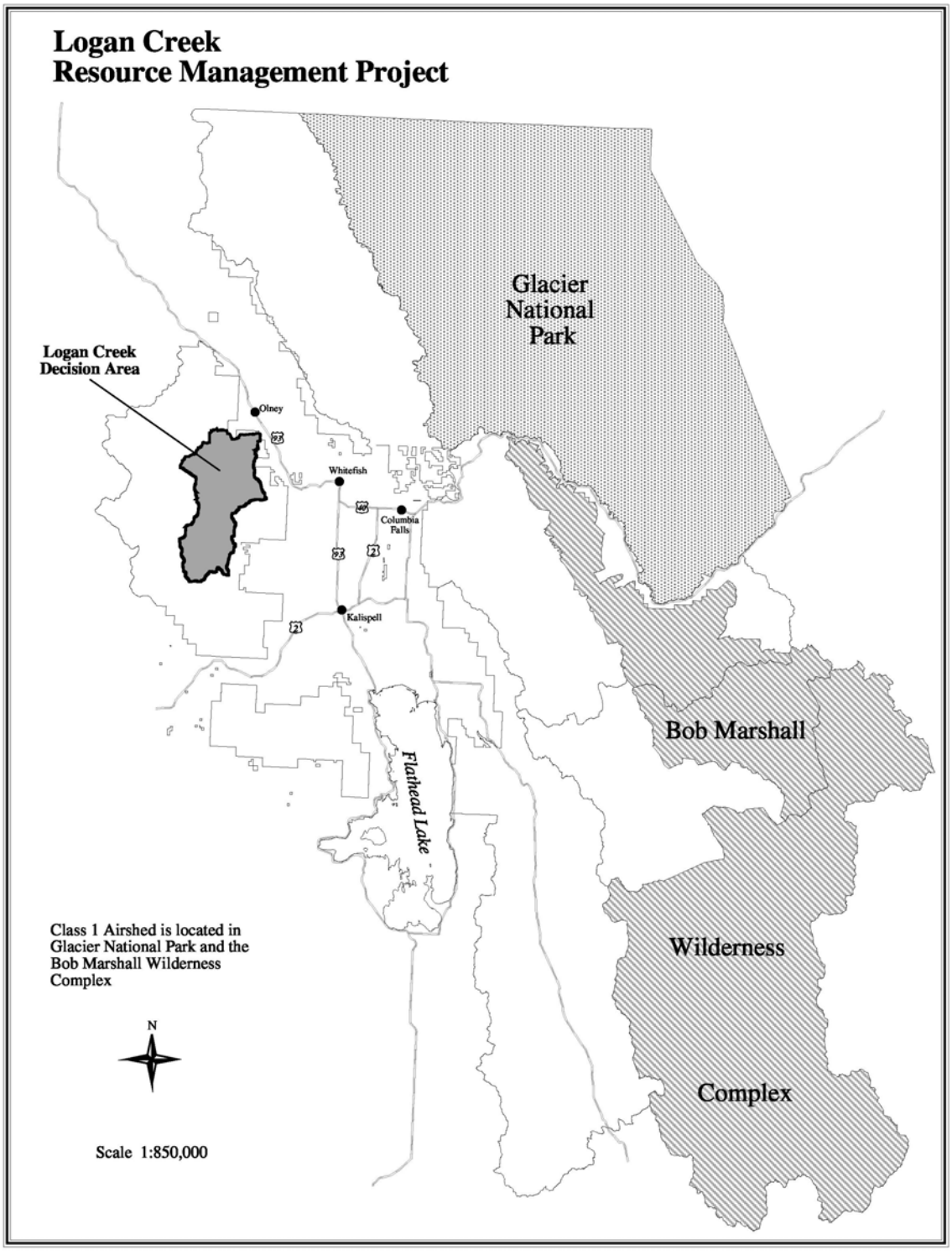
The amount of smoke generated from prescribed fire has been reduced from earlier levels of post-settlement burning because modern forest managers schedule prescribed burns during periods of good smoke dispersion.

Treatment of fuels by prescribed fire has become more common over the past 30 years on the Flathead National Forest and within the Logan Creek analysis area. Smoke emissions have been commensurate with the consumption of fuels by prescribed fire on the Tally Lake Ranger District.

The annual prescribed fire program has averaged 1001 acres per year over the past 10 years. Most prescribed fire occurs during periods of low risk for escaped fire (typically late spring or fall). The Flathead National Forest, Tally Lake Ranger District has been very successful in conducting a safe prescribed fire program. Due to complete planning and implementation during seasons with lessened escape risk, the district has had no escaped prescribed fires. During implementation, there have been small spot fires outside of the units, but these have been successfully controlled by holding forces at the incident. In 1977, the Forest was called to assist in controlling an escaped slash disposal fire being conducted by private individuals on private land near Sanko Creek gravel pit. Before the fire was controlled, 30 acres burned.

According to the U.S. Environmental Protection Agency's Report AP-42, *Compilation of Air Pollution Emission Factors* (1996), prescribed burning generates some air pollution, although the net amount is believed to be a relatively smaller quantity than that produced by wildland fires. The Environmental Protection Agency states in this report "prescribed fire is a cost-effective and ecologically sound tool for forest, range, and wetland management. Its use reduces the potential for destructive wildland fires and thus maintains long-term air quality." The planning, scheduling, coordinating, and monitoring of prescribed fire on national forest lands follows the standards described in the 1967 Clean Air Act and Amendments to the Act (1972, 1977, and 1990) that provide direction to protect and enhance the quality of the nation's air resources and to protect public health and welfare.

Figure 3-6. Air Quality Vicinity Map.



Existing Air Quality Situation

Air quality in the various airsheds is affected by smoke, dust, industrial sources, and motor vehicle exhaust. Smoke is generated from occasional wildland fires, prescribed burning, residential wood burning, and agricultural field burning. Along with local sources, smoke is blown into the area from Washington, Idaho, Canada, and western Montana. Affects to air quality also include re-entrained road dust, primarily from vehicle traffic on gravel and native surface roads in summer, spring, and fall; on paved sanded roads in all seasons; and from wind erosion on agricultural lands. Industrial sources of airborne pollutants include an aluminum plant in Columbia Falls and local sawmills.

Visibility in the Class I airsheds is monitored by the State Air Quality Bureau. Monitoring sites are located in Glacier National Park and the Bob Marshall Wilderness Complex. Visibility is generally good in the Class I airsheds. Some impairment of visibility occurs in the spring and fall due to the cumulative effects of smoke generating actions across Montana and adjoining states.

Air quality in Montana Airshed #2 is generally considered to be good to excellent through a majority of the year. Seasonal variations occur, resulting from weather conditions such as temperature inversion. Areas in the airshed that are not adjacent to, or within, urban areas are generally within acceptable levels of particulate matter.

Air quality in the Kalispell, Columbia Falls, and Whitefish PM-10 Impact Zones is generally good. Please see the Regulatory Framework section below for a discussion of PM-10/PM-2.5 and Clean Air Act standards. Some populated valleys have periods of poor air quality that is attributed to stagnant air and high-pressure systems that trap pollutants, particularly in the winter months. Only a small percentage of the particulate matter (generally less than 2 percent) in these airsheds is attributed to burning of forest residue (Raisch and Jeffery 1988). The majority of particulate matter is attributed to re-entrained road dust and residential wood burning. Since 1990, Kalispell has had only two violations of the National Ambient Air Quality Standards (NAAQS) 24-hour PM-10 standard (both were at the Universal Athletic monitoring site) and occurred during the month of February in 1991. These are attributed to re-entrained road dust and residential wood burning. The Columbia Falls monitoring site has not recorded any violations of the NAAQS 24 hour PM-10 standard since 1990. The Whitefish monitoring site has recorded only one violation in the NAAQS 24 hour PM-10 standard since 1994. This violation in 1997 was attributed to the ongoing bridge construction and building demolition immediately adjacent to the receptor site. Also, at the same locales and during the same time frames, no violations of the NAAQS annual PM-10 standard have occurred.

The downward trend since 1994 in the maximum values for 24-hour particulate matter and the annual arithmetic average for all three nonattainment areas is attributed to implementing measures for reducing particulates. These measures are increased miles of gravel surface travel ways that have been paved, automated road sweeping/washing, use of liquid road deicer, and the reduction in the use of sand on paved road surfaces during adverse cold weather conditions. This has reduced the re-entrained road dust quantity that is the primary source of particulate matter impairing these airsheds. The source of all data represented in the existing condition section is in Exhibit J-1 (U.S. EPA 1998).

All burning associated with the proposed alternatives would be in compliance with permit #MOB 90-1 with the Montana Department of Health & Environmental Science, Air Quality Bureau. This permit is updated annually.

REGULATORY FRAMEWORK

Forest wide standards for maintaining air quality are: "Coordinate all Forest Service management activities to meet the requirements of the State Implementation Plan, State Smoke Management Plan, and Federal air quality standards" (FNF, LRMP, II-64, Forest Plan). There are no specific Forest Plan directions by Management Area for air quality. Whenever prescribed fire is used, Forest Plan Appendix G states, "Esthetic, visual, soil, air, and water quality concerns will dictate fire management direction in some areas."

The 1967 Clean Air Act and Amendments to the Act (1972, 1977, 1990), (42 U.S.C. 7401 et seq) provide direction to protect and enhance the quality of the nation's air resources and to protect public health and welfare.

Section 109 of the Clean Air Act requires the Environmental Protection Agency to develop primary air pollution standards to protect human health and secondary standards to protect public welfare.

Section 110 requires states to develop State Implementation Plans that identify how the state will attain and maintain national ambient air quality standards and other federal air quality regulations. The State Implementation Plan is made known through the Montana Clean Air Act and implementing regulations. The regulations provide specific guidance on maintenance of air quality, including restrictions on open burning (ARM 16.8.1300). The act created the Montana Air Quality Bureau and provides its regulatory authority to implement and enforce the codified regulations.

Concerns for air quality can generally be divided into two areas: pollutants and visibility.

Pollutants - National Ambient Air Quality Standards (NAAQS) exist for certain pollutants. These are called criteria pollutants that include ozone, carbon monoxide, sulfur oxides, lead, and particulate matter. The production of particulate matter is the pollutant of most concern associated with prescribed burning. Specifically, prior to July 1997, the standards were particulate matter that is less than or equal to 10 microns in aerodynamic diameter (PM-10). These standards were: (1) the concentration of PM-10 must not exceed 150 micrograms per cubic meter over a 24-hour period and, (2) the annual arithmetic average must not exceed 50 micrograms per cubic meter. These particles are the size that can penetrate the inner recesses of the lungs, causing health problems and most severely impact local and regional visibility.

In July 1997, the Environmental Protection Agency adopted a more stringent NAAQS for fine particulate matter that is less than or equal to 2.5 microns in aerodynamic diameter (PM-2.5). The current standards are: (1) the concentration of PM-2.5 must not exceed 65 micrograms per cubic meter over a 24-hour period and (2) the annual arithmetic average must not exceed 15 micrograms per cubic meter. Approximately 70 to 90 percent of particulate matter emitted from burning of forest residue is primarily this size class.

Visibility - Under the 1977 Clean Air Act amendments, areas of the country could be designated as Class I, II, or III airsheds for Prevention of Significant Deterioration (PSD) purposes with the option that Class II and III areas could be upgraded to Class I. Class I airsheds include national parks and designated wilderness areas. Section 169a of the act establishes a national goal of remedying existing and preventing future man-made visibility impairment in Class I airsheds.

Implementation of Regulations

To maintain compliance with the various regulations concerning maintenance of air quality, Region One of the Forest Service participates in the Montana/Idaho Airshed Group. The Group is comprised of timber companies and government agencies that commonly conduct prescribed burning, and federal, state, and local air regulators. Participants in the Group include Plum Creek Timber Company, Forest Service, Montana Department of Natural Resources and Conservation, Confederated Salish and Kootenai Tribes, Montana and Idaho Departments of Environmental Quality, Flathead County Health Department, and others. The self-governing Group, under the head of the State Forester, regulates prescribed burning on lands administered by the cooperators.

The Group has developed a set of smoke management practices intended to maintain compliance of the State air quality standards through a Memorandum of Understanding with the Montana Air Quality Bureau. Beginning March 1, 2000, this includes a monitoring system for the months of the open burning season that extends from March 1 through November 30. The spring and summer months are generally good for smoke dispersal due to normal strong wind patterns. The winter months are closed to all open burning due to the occurrence of cold air inversions and the resulting poor dispersal. The Montana Air Quality Bureau recognizes the current smoke management practices and the Montana airshed coordinating process as Best Available Control Technology for prescribed burning.

The central control point of the Group's monitoring system is in Missoula, Montana, which enables them to coordinate directly with the state meteorologist and U.S. Weather Service. Cooperators submit daily burning plans to the central control point. These plans are aggregated and submitted to the State Air Quality Bureau in Helena for approval. Daily burning plans are approved or disapproved by the State Air Quality Bureau and locally by the Flathead County Health Department based on probability of compliance with regulations limiting levels of particulate matter and reduction of visibility in Class I airsheds. The Forest Service is issued an annual permit to burn by the Montana Air Quality Bureau. Issuance of this permit is based on our participation in, and compliance with, burning restrictions set by the Montana and Idaho Interstate Airshed Group.

The Forest Service is a party in a Memorandum of Understanding with the State of Montana. Through this agreement, the Montana and Idaho Smoke Management Group shares information and coordinates activities to assure cumulative actions do not result in unacceptable effects on air quality in Montana.

Environmental Consequences

Direct and Indirect Effects of Alternative A - No Action

There would be no direct effects to the air quality or human health from Alternative A. The indirect effects to the air quality would occur when a wildland fire escapes initial attack efforts and starts to burn in unmanaged stands or in untreated fuels. Downed material combined with ladder fuels from the developing shade tolerant understory would act as a fuel source for a wildland fire. Smoke from wildland fires is unmanageable and would likely produce smoke in intensity and duration much greater than what would be produced by the planned ignitions of any of the action alternatives. The severity of air quality degradation from wildland fire is unpredictable. Air quality impacts from wildland fire would normally occur during the summer months when visitor use in affected airsheds is highest.

Alternative A would not implement any prescribed burning and would not directly contribute to air quality impacts. However, the potential of a large-scale wildland fire is greatest with Alternative A, and a large-scale fire could have far greater impacts on air quality than any action alternative would. Air quality would not be impacted until a fire escapes initial attack efforts. At that time there would be a higher level of particulate matter released than prescribed burning because of the greater amount of fuel consumed. The eventual wildland fire would have a much different impact than what a prescribed fire would have under a controlled situation. Prescribed fire impacts usually last for a short period of time and are managed for the least amount of air quality impacts possible. Air quality from wildland fires could be impacted for weeks, as was experienced in Northern California and Southern Oregon in 1987, and various parts of the Northern Rockies in 1988, 1994, 2000 and 2001.

Alternative A would not implement any prescribed fire use; therefore, it poses no risk of prescribed fire escape.

Direct, Indirect, and Cumulative Effects Common To All Action Alternatives

Proposed fuel management treatments for all action alternatives involve prescribed burning. Many factors contribute to the amount of smoke produced from a burn including weather conditions, combustion processes, fuel properties (moisture, loadings, arrangement), and type of burn. The effects of smoke on air quality are of short duration due to regulatory requirements, weather factors, the qualities of smoke itself, and smoke impact reduction measures.

Smoke created by burning activities would temporarily reduce air quality. Much of the burning and subsequent loss of air quality would occur in the spring and autumn seasons when fuel moisture and atmospheric conditions are conducive to meeting all resource objectives.

With prescribed burning, smoke can be held to a minimum duration and intensity, although burning can temporarily reduce air quality. However, prescribed burning can reduce the acute impacts to air quality from wildland fires in the long-term. Levels of emissions from

prescribed burning are below health standards, while wildland fires can produce emissions that are more than double federal health standards. Refer to the Upper Columbia River Basin DEIS for a more in-depth discussion about air quality trade-offs between prescribed fire and wildland fire (U.S. Department of Agriculture and U.S. Department of the Interior, 1997).

Differences among the action alternatives are related to the type of burning and amount of fuel to be treated. The effects of the alternatives will be assessed based on the prescribed burn method and the acres of planned prescribed burning. The following prescribed burning methods would be used in all action alternatives:

- **Underburning** would occur in proposed harvest units and other timber stands. The objectives are:
  1) to reduce fuel loading from harvest activities, while protecting the remaining overstory trees;
  2) reduce ladder fuels;
  3) maintain sufficient down woody debris for nutrient and moisture cycling;
  4) minimize soil disturbance; and
  5) improve palatable browse for wildlife.

  Underburning is deliberately slow to protect desired leave trees, so combustion is less efficient than with broadcast burning. More smoke per acre is produced than with other methods. Well-developed convection columns needed to aid smoke dispersal are seldom obtained as fire intensities are deliberately moderated to facilitate leave tree survival. Smoke generated from underburns typically lifts to approximately 6000 feet or greater and drifts with the prevailing wind present in the area.

- **Pile burning** is used to dispose of woody debris that has been mechanically or hand piled. The objective of pile burning is hazard reduction. Pile burning is more effective at protecting overstory trees that are susceptible to fire. Combustion can be very efficient, but varies widely due to several factors. Unlike understory and broadcast burning, which is done in the spring and fall, pile burning is accomplished in the late fall when escape potential is lowest. Because of this time frame, pile burning is usually compressed into fall days with adequate ventilation. During this time of year, days that have good ventilation can be limiting. This can lead to greater emissions over a shorter period of time. Also, there is usually more competition within the airshed as woodstove users begin to heat homes.

It is also important to understand the role that season of burn has on potential air quality impacts. Spring burning conditions have the least impact on air quality. The reasons for this are summarized below:

- Large woody fuel and duff moistures are high. High moistures in large woody fuels and duff limit the amount of fuel consumed and thus the amount of emissions produced. Also, smoldering fires are less likely to persist when duff is moist.

- Spring weather patterns and normal daytime heating lessens the chance for temperature inversions. Without inversions, the chances for the cumulative effects of air pollution to create health impacts are minimized as dispersion and ventilation cleanses the airsheds.

- Unstable weather patterns allow for better smoke dispersion during the actual burning process.

- Fuels outside burn units have higher fuel moistures that minimize the risk of an escaped burn. An escaped burn would produce emissions greater than those predicted.

- Cumulative impacts of PM-10 and PM-2.5 concentrations are reduced during spring months since a major contributor (residential wood smoke) produces fewer emissions (less woodstove use due to warmer temperatures).

Effects Downwind **-** For all action alternatives, smoke generated from within the area could affect the air quality in northwestern Montana. Potential exists for smoke to drift into the following Class I airsheds, nonattainment areas, local communities, and campground:

Glacier National Park (Class I)	21 miles East-Northeast
Bob Marshall Wilderness (Class I)	30 miles East-Southeast
Olney (local community)	6 miles Northeast
Intermix Community Type	Within the area
Whitefish (nonattainment)	9 miles East
Columbia Falls (nonattainment)	16 miles East
Kalispell (nonattainment)	16 miles East-Southeast
Tally Lake Campground (sensitive area)	Within analysis area

Prescribed burning can cause smoke management concerns, especially if smoke drifts into populated, nonattainment, or Class I airsheds. Data derived from mass balance studies (Air Quality Bureau of the Montana Department of Health and Environmental Sciences) suggests that forestry slash burning contributes from 1.2 percent (Libby) to 1.5 percent (Kalispell) of the total PM-10 contribution to these communities on a yearly average. On a daily basis, the contribution has risen up to 8.8 percent (Kalispell). Federal and state ambient air quality standards have been established for PM-10 concentrations.

One of the most important factors affecting the ambient air quality of these airsheds is the weather. Because of the dynamic nature of the air resource and the inability to accurately forecast long-range weather conditions, effects on air quality from prescribed burning at a given location are difficult to analyze. However, there are two models that are usable to estimate fuel consumption: on site smoke emission production (particulate matter) and dispersion. The First Order Fire Effects Model: FOFEM 4.0 (Reinhardt et al, 1997) and FOFEM 5.0 (Reinhardt, et al. *in press*) were used to determine fuel consumption and subsequent smoke emissions production. Smoke Impact Spreadsheet (SIS) Version 01-28-02 (Air Sciences 2002), a modeling system for calculating PM-2.5 emissions and airborne concentrations downwind of natural or managed fires, was used for dispersion modeling of PM-2.5 concentrations. As a screening model, SIS provides conservative (higher than actual) predictions of the downwind air concentrations at user selected receptors for comparison with appropriate federal or state air quality standards for PM2.5. NFSPUFF3 Version 3.04 (Harrison 2002), a dispersion model for smoke management of prescribed or natural fire in complex terrain, was used for dispersion modeling of smoke plume characteristics and maximum dispersion distances.

Two spring underburns and comparative stand-replacing wildland fires, which covered the same area, were modeled to estimate the potential effects on air quality in the nonattainment areas of Whitefish and Columbia Falls; and visibility impacts to Class 1 airsheds, in this case the Bob Marshall Wilderness Complex and Glacier National Park. The two spring underburns chosen represent the largest contiguous prescribed fire treatments, with the greatest potential to impact the airsheds, which would be independently ignited for all action alternatives. All other prescribed fire use would involve less impact to the air resource. The respective prescription parameters for spring underburning were followed for both underburns. The severe summer fire conditions for the comparative wildland fires all include good smoke dispersion and mixing characteristics with exception of wind direction**.** A wind direction most impactive to Whitefish was chosen to model effects, which coincides with prevailing westerly winds. The modeling data sets, parameters, and itemized results for the smoke modeling are in Exhibit J-2. Explanation is provided following the table.

Table 3-39. Underburn versus Wildland Fire Summary of Modeling Results.

Burn Type	FOFEM Total PM-10 and PM-2.5 Emissions *	Whitefish, Smoke Plume Cross Section, 3 hrs. after ignition (Elevation & maximum PM-10 concentration)	Whitefish, 24-hour Average PM-2.5 Surface Concentra-tion	Whitefish, Day After the Burn or Fire, 24-hour Average Surface Concentra-tion of PM-2.5 and PM-10	50 Miles Downwind, 24-hour Average PM-2.5 Surface Concentra-tion	Downwind Dispersion Distance
Post Harvest Underburn #20	68.4 tons; 57.9 tons	7700-11,000 ft 8565 ug/m3	1.3023 ug/m3	0 ug/m3	3.9556 ug/m3	> 134 miles
Wildland Fire	110.7 tons; 93.8 tons	8900-13,000 ft 12,745 ug/m3	1.0252 ug/m3	0 ug/m3	3.4676 ug/m3	> 134 miles
Underburn #200	26.0 tons; 22.1 tons	6200-8900 ft 2,309 ug/m3	5.8476 ug/m3	0 ug/m3	1.1963 ug/m3	> 134 miles
Wildland fire	51.0 tons; 43.2 tons	8200-12,000 ft 4,274 ug/m3	9.6471 ug/m3	0 ug/m3	1.6344 ug/m3	> 134 miles

* FOFEM total PM-2.5 emissions are approximately 84.6% of the PM-10 emissions.

The first underburn is a post-harvest treatment in Unit 20 on approximately 147 acres. The pre-treatment condition of Unit 20 is a mixed severity2 fire regime-current condition class 2 and a surface fire behavior fuel model 10. The downwind distance from Unit 20 to Whitefish is 16.0 air miles. The second underburn, with intermittent light slashing to carry a low intensity surface fire, is ecosystem burn number 200 at approximately 169 acres. The pre-treatment condition of Unit 200 is a mixed severity2 fire regime-current condition class 2 and

is primarily a surface fire behavior fuel model 8 with inclusions of fuel model 10. The downwind distance from Unit 200 to Whitefish is 11.0 air miles. The stand-replacing wildland fires are modeled on 147 acres and 169 acres, respectively. Results of the modeling are presented in Table 3-39.

Although these values may not be absolute, they have some utility in estimating potential impacts to air quality. The results indicate that all scenarios modeled contribute PM-10/PM-2.5 emissions to the nonattainment area of Whitefish, but are substantially under the daily standard of 65 ug/m3 of PM-2.5 and are of short duration (less than 2 days). Also, all may contribute to the reduction in visibility to the Bob Marshall Wilderness and Glacier National Park. The greatest disparities lie in the volume of PM-10/PM-2.5 produced, the efficiency of the transportation, and dispersion of PM-10/PM-2.5 or smoke. Simply, the effects of wildland fire, as opposed to prescribed fire use in a controlled setting, are more pronounced on air quality both from a contribution of pollutants over a broader area and a reduction in visibility or regional haze standpoint, even on similar acreage burned.

As stated previously, the principal impact to air quality in Class I airsheds from prescribed burning is the temporary visibility impairment caused by smoke. This may reduce the quality of forest recreation experiences, as vistas within and beyond the boundaries of the Class I airsheds may be temporarily obscured by smoke and haze, although the visible impairment would occur during the spring and fall which are periods of relatively low visitation to these areas.

During the springtime, when most of the underburning would be conducted and smoke dispersal is best, the model indicates smoke would diminish relatively quickly, usually in one to three days. Burning in the spring emits less particulates overall, as larger fuels and duff layers are damp and are not included in the combustion.

Fall smoke levels would take several days longer to disperse because inversions settle in the valleys and trap larger volumes of smoke. Some of the higher elevation units, particularly those on northerly aspects, would need to be burned in the early fall. This period of burning is regulated by the Montana and Idaho Interstate Airshed Group and Flathead County Health Department; any prescribed fire use would be coordinated and approved through them to reduce potential air quality impacts.

The levels of smoke anticipated from the action alternatives is not expected to be a health concern, with the exception of people living directly adjacent to the burns who are severely sensitive to smoke. The Tally Lake Ranger District policy is to personally contact all residents adjacent to areas proposed for burning to inform them of potential burning and identify those that have health concerns associated with anticipated smoke levels. Additional steps would be taken prior to burning to alert other nearby residents, including newspaper ads, posting notices, mailings, and/or contacting key members of the residential areas or communities. The intent is to provide smoke-sensitive individuals adequate notice of planned burning.

Dust and exhaust from vehicles during timber harvest would contribute short-term effects to air quality. Effects would be localized to the immediate vicinity of the operations.

Smoke and Road Use Impact Reduction Measures Common to All Action Alternatives - Several measures would be used to reduce the effects of prescribed burning and smoke on air quality. The Montana and Idaho Interstate Airshed Group operates an air quality monitoring unit from March 1 to November 30 annually and the Flathead County Health Department monitors burning at the local level during all seasons of prescribed fire use. These monitoring units regulate prescribed burning of all major burners in the airshed by restricting or curtailing burning activities when poor ventilation conditions exist or are forecast. Besides operation of the monitoring group in the fall, the following measures would be used to help reduce emissions and/or reduce the effects of smoke from prescribed burning:

- One of the objectives of prescribed burning is to reduce the threat of wildland fires, so burning itself is a smoke reduction measure. The amount of fuel consumed and the subsequent smoke emissions from prescribed fire can be managed to a degree, whereas the smoke emissions from wildland fires are unmanageable.

- Late spring burning would be maximized to help reduce the amount of fuel consumed, to allow for more favorable smoke dispersal conditions, and to conduct burns during periods of less competition within the airshed.

- Tally Lake Campground would be closed for approximately 3 days during the implementation of Unit 200 underburn to mitigate the exposure of the public to the short term smoke emissions.

- Burn bosses would terminate any burn in the event smoke behavior is not as forecast and there is potential for smoke to adversely impact local communities.

- Nighttime burning that could affect local communities would be avoided, as smoke dispersal is at its worst during this time.

- Machine piles would be reasonably free of dirt and sufficiently cured to facilitate good combustion, thereby reducing production of smoke.

- Stumps and heavy fuels (logs) would be mopped up adjacent to private land near any residences. This would be done to reduce the lingering, smoldering smoke that can occur from these fuels, as well as to help prevent escapes.

- Whole tree yarding, yarding unmerchantable material, and spot excavator piling of heavy concentrations of logging and thinning slash would be done when necessary before the underburns. The landing piles and excavator piles would be burned prior to the underburn in order to reduce the amount and duration of smoke resulting from the underburns.

- Dust abatement on logging haul routes would be kept current and commensurate with timber harvest activities.

Risk of Escape - There are risks involved in prescribed burning, mainly dealing with escaped fires. However, the majority of prescribed burning done on the Tally Lake Ranger District has been successfully completed with minimal escapes. Even minor slop-overs of one to two

acres only happen occasionally (less than 5 percent of all burns), and these have all occurred in higher elevation units away from private land. For cost efficiency reasons, more risk is taken in these remote areas, whereas more precautions are taken when burning near private land. No prescribed burns adjacent to private land on the Tally Lake Ranger District have ever become escaped wildland fires. Only one prescribed fire escape has been recorded since 1970 that involved approximately 35 acres in the Robertson Creek drainage.

Spring underburning and late fall slash pile burning would be priority treatment periods when fuel moisture levels are high outside of treatment areas. When only underburning is prescribed adjacent to a harvest activity, the post sale activities (including slash treatment, fuel breaks, or firelines) within the harvest area would be prioritized first for implementation.

Prevailing westerly to southwesterly winds cause nearly all control problems on the north and east sides of the prescribed burn areas. To help prevent escaped wildland fires adjacent to private land boundaries, fuel breaks (which include thinning, pruning of ladder fuels, and/or firelines) would be done with special attention given to the north and east sides of the prescribed burn areas prior to the underburn. Excessive accumulations of fuels from pre-burn treatments would be piled and burned under high moisture conditions prior to underburning. These efforts help to reduce the amount of torching and spotting which is often a cause of even minor escapes.

Prescribed fire management plans (burn plans) are approved by fire management officers for each individual prescribed burn and include plans for ignition, holding, escape fire contingency, mop-up, and patrol. The reason for the burn plan development is to ensure that each burn meets the objectives that were prescribed for that particular area. The plan is designed to utilize the prescribed weather, personnel, and equipment that are needed to control the burn within the unit boundaries and to achieve desired silviculture objectives. Strict adherence to the burn plan is required for each burn boss.

Direct and Indirect Effects of Action Alternatives B, C, D, E, and F

The table below shows the on-site total particulate emissions (in tons) estimated to be generated by each of the action alternatives. The total estimated tons of particulate emissions displayed are the PM-10 production. The production of PM-2.5 is approximately 84.6 percent of the PM-10 respective totals, based on FOFEM 5.0. No alternatives include salvage of any mortality following prescribed burning. FOFEM 5.0 Smoke Emissions Calculations by cover type by treatment and computations of smoke emissions (PM-10 and PM-2.5) by cover type by treatment by alternative are in Exhibit J-2.

Table 3-40. Estimated Tons of PM-10 Produced by Alternative. Tonnage is rounded to the nearest ton.

Treatment	Alt. B Total PM 10 emission	Alt. C Total PM 10 emission	Alt. D Total PM 10 emission	Alt. E Total PM 10 emission	Alt. F Total PM 10 emission
Underburn Only (no harvest, intermittent slashing)	87	87	87	87	87
Post-Harvest Underburn (lodgepole pine types)	197	152	24	186	94
Post-Harvest Underburn (spruce/subalpine fir types)	29	14	29	29	29
Post-Harvest Underburn (western larch types)	37	33	20	37	33
Post-Harvest Underburn (Douglas-fir types)	267	112	140	267	211
Intermediate Harvest (lodgepole pine types) Excavator pile/burn	50	50	64	53	119
Intermediate Harvest (spruce/subalpine fir types) Excavator pile/burn	34	18	29	18	29
Intermediate Harvest (western larch types) Excavator pile/burn	24	54	74	31	110
Intermediate Harvest (Douglas-fir types) Excavator pile/burn	191	254	318	269	290
Regeneration Harvest (lodgepole pine types) Excavator pile/burn	393	179	160	382	261
Regeneration Harvest (spruce/sub-alpine fir types) Excavator pile/burn	170	135	128	168	73
Regeneration Harvest (western larch types) Excavator pile/burn	271	77	116	236	100
Regeneration Harvest (Douglas-fir types) Excavator pile/burn	1059	602	723	887	778
Slash/Pile/Burn (300 Series Units & WUI treatment, 200' to 300"strip along private ownership where precommercial thinning is prescribed)	37	37	27	37	27
Total PM-10 Emissions	**2846**	**1804**	**1939**	**2687**	**2241**

Cumulative Effects of Action Alternatives B, C, D, E, and F

Air Quality

Past, present, proposed, and reasonably foreseeable activities were reviewed to determine cumulative effects to air quality. Most impacts to air quality from forest management activities are short-lived. Burning associated with foreseeable actions, other Ranger District projects, as well as projects in the adjacent Ranger District outside the area can be expected. Some smoky days are likely to occur from reasonably foreseeable actions. The greatest impact from burning outside the area would be from a visual perspective. The Airshed Group regulates all other Ranger District and Forest burning with concurrence by the Flathead County

Health Department. Adhering to the Memorandum of Understanding would regulate the amount of impact that smoke would have on the area as well as the nonattainment areas of the Flathead Valley. Residents in and around the area would continue to experience effects of smoke from reasonably foreseeable actions. This would be at much the same intensities as has been experienced seasonally for the past several years. Implementation of all or part of the proposed activities may increase the number of days that smoke is produced.

Timber Management and Fuels Reduction Activities

Future blowdown salvage, precommercial thinning that is not adjacent to private property, and harvest of Christmas trees and boughs do not include fuels reduction burning and therefore would not cumulatively affect air quality.

Private Land Development

Continued development of private land for residences would likely result in periodic smoke production from slash burning associated with home site clearing and burning wood for heat. Cumulative effects could include an increase in both the amount of smoke and duration of days with smoke present. While the Forest Service has no influence over burning which takes place on private land, the conditions resulting from these sources as well as from wildland fires would be taken into account when determining whether to ignite any prescribed fire. Although these burns from private landowners (that are nonmembers of the Airshed Cooperative Group) are not tracked by the Monitoring Group, Ranger District fire managers visually check conditions prior to making the decision to ignite an adjacent prescribed fire area.

Wildlife Habitat Improvement

Units 202 and 202.1 total approximately 280 acres of prescribed underburning fire treatment to enhance wildlife browse production and restore the historic natural opening. Of the 280 acres, 123 are currently a mosaic of brush, rock outcroppings, and a minor component of encroaching conifers within the natural openings. There are 157 acres also comprised of encroaching conifers adjacent to the existing natural openings. The prescribed burn treatment would be implemented in four different stages. Each stage would be ignited at different times when silviculture and burn prescriptions can be achieved safely. The acreage burned and expected emission production for each entry would be substantially less than the prescribed burn of Unit 200 previously discussed earlier in this section. However, there may be a short-term (less than 2 days for each entry) reduction in visibility to the Bob Marshall Wilderness Complex and Glacier National Park. This reduction in visibility would occur during low visitation periods.

Other Activities

Other foreseeable actions include noxious weed control, road maintenance, administrative road use, public recreational use, and small forest products gathering for personal use. These activities may include limited burning, but would not have cumulative effects to air quality.

Large-Scale Cumulative Effects

The cumulative effects on regional air quality due to forest management activities are difficult to quantify. Because prescribed burning reduces fuel loadings, the potential for fires escaping initial attack is reduced. Therefore, the long-term effects of smoke from wildland fires on air quality are reduced. As discussed earlier, prescribed burning of forest fuels is a minor contributor of PM-10/PM-2.5 emissions when compared to other sources. Under favorable weather conditions, the impacts of all PM-10/PM-2.5 contributors are minimized. However, under stagnant atmospheric conditions, smoke from prescribed burns, wildland fires, residential wood burning, re-entrained road dust, vehicle exhaust, and other sources of air pollution can create a short-term, unhealthy impact on local air quality.

In late spring, summer, and autumn, burning of slash is a common management practice occurring on the Flathead National Forest, other Federal and State land management agencies, and private forest lands. Weather patterns, topography, and fuel characteristics during these burning seasons are the key factors affecting air quality. As previously mentioned, spring burning conditions have the least impact on air quality. Fall burning has the greatest potential to impact air quality. The Montana Smoke Management Group regulates spring, summer, and fall burning by making daily evaluations as to whether or not members may burn, based on local and prevailing weather information and existing air quality conditions.

Smoke from prescribed burning associated with present, proposed, and foreseeable activities, combined with that of other PM-10/PM-2.5 producing activities in the region, has the potential to temporarily reduce air quality in the areas of Olney, Whitefish, Columbia Falls, and Kalispell. General wind patterns may cause smoke to drift into the Class I Airsheds of Glacier National Park and the Bob Marshall Wilderness Complex. Visibility may be temporarily reduced while prevailing weather influences mixing and dispersion of smoke. Effects would be minimized in the mid- to late-spring because of fewer visitors, higher fuel moistures (less emissions), better smoke dispersion, and reduced impacts from other PM-10/ PM-2.5 producing activities. These anticipated impacts are considered to be within a reasonable range for these activities and pose no substantial health or environmental effects.

REGULATORY CONSISTENCY

By participating in the Montana and Idaho Interstate Airshed Group, complying with the Memorandum of Understanding with the Montana Air Quality Bureau, and meeting the requirements of the State Implementation Plan and the Smoke Management Plan, the proposed activities would comply with the Forest Plan and the 1977 Clean Air Act.

By treating both natural and activity generated fuels, the proposed activities would meet the objectives of the LRMP in which the fuels management program intends to treat fuels to the degree needed to facilitate implementation of the fire protection program and other dependant activities of the LRMP. The proposed activities are also consistent with State laws requiring the treatment of slash to reduce the effects of high intensity fires.